

Claims

What is claimed is:

5 1. A tunable low noise amplifier matching circuit comprising:  
a ferro-electric tunable component;  
a low noise amplifier matching circuit comprising the ferro-electric tunable component;  
10 a control line operably coupled to the ferro-electric component;  
a control source electrically coupled to the control line, the control source configured to transmit a control signal on the control line;  
15 wherein the ferro-electric component, responsive to the control signal, adjusts the impedance of the matching circuit.

2. The low noise amplifier matching circuit of claim 1, further comprising a low noise amplifier coupled to the matching circuit.

20 3. The tunable low noise amplifier matching circuit of claim 1, wherein the ferro-electric tunable

2024-2025-00000000

component comprises a ferro-electric tunable capacitor.

4. The tunable low noise amplifier matching circuit of claim 3, further comprising a substrate wherein

5 the capacitor is directly mechanically coupled to the substrate and the low noise amplifier is directly mechanically coupled to the substrate.

5. The tunable low noise amplifier matching circuit of claim 1, wherein the matching circuit

10 comprises:

an inductor, one end of the inductor comprising to an input port of the matching circuit;

15 the ferro-electric tunable capacitor coupled to the inductor and to the input port;

a second inductor coupled to the ferro-electric tunable capacitor and to a third inductor;

20 wherein the second and third inductors are configured to be coupled to a low noise amplifier.

6. The low noise amplifier matching circuit of claim 1, wherein the matching circuit is configured to

minimize a noise figure of a low noise amplifier at a preselected frequency.

7. The low noise amplifier matching circuit of claim 6, wherein, responsive to the control signal, the ferro-electric tunable component tunes the frequency.

8. A wireless communication device comprising:

    a battery;

    a transceiver;

10     a user interface;

    a housing encasing the battery and the transceiver and adapted to present the user interface external to the housing;

    a low noise amplifier amplifier;

15     a ferro-electric tunable component coupled to the low noise amplifier;

    a low noise amplifier output matching circuit coupled to the low noise amplifier, having an impedance and comprising the ferro-electric tunable component;

20     a control signal generator for generating a control signal;

DRAFT - 2024-02-02

a control line coupled to the control signal generator and to the ferro-electric component;

5 a control source electrically coupled to the control line, the control source configured to transmit a control signal on the control line;

wherein the ferro-electric component, responsive to the control signal, adjusts the impedance of the matching circuit.

9. The low noise amplifier matching circuit of claim

10 8, further comprising a low noise amplifier coupled to the matching circuit.

10. The tunable low noise amplifier matching circuit of claim 8, wherein the ferro-electric tunable component comprises a ferro-electric tunable 15 capacitor.

11. The tunable low noise amplifier matching circuit of claim 10, further comprising a substrate wherein the capacitor is directly mechanically coupled to the substrate and the low noise amplifier is directly mechanically coupled to the substrate. 20

12. The tunable low noise amplifier matching circuit of claim 8, wherein the matching circuit comprises:

an inductor, one end of the inductor  
5 comprising to an input port of the matching circuit;

the ferro-electric tunable capacitor coupled to the inductor and to the input port;

10 a second inductor coupled to the ferro-electric tunable capacitor and to a third inductor;

wherein the second and third inductors are configured to be coupled to a low noise amplifier.

13. The low noise amplifier matching circuit of claim 8, wherein the matching circuit is configured to 15 minimize a noise figure of a low noise amplifier at a preselected frequency.

14. The low noise amplifier matching circuit of claim 13, wherein, responsive to the control signal, the 20 ferro-electric tunable component tunes the frequency.